

REMARKS

I. Introduction

As a preliminary matter, Applicants note that the Office Action states that the title of the invention is not descriptive and a new title is required that is clearly indicative of the invention to which the claims are directed. No guidance as to how the Title should be amended was provided. In response, Applicants point out that the Title of the application is “LEAD STORAGE BATTERY” and all pending claims are directed toward a “lead storage battery”. As such, the title exactly describes the subject matter to which the claims are directed. If the Examiner maintains this objection, Applicants respectfully request guidance from the Examiner as how to amend the Title. Otherwise, Applicants respectfully request that the objection be withdrawn.

For the reasons set forth below, Applicants respectfully submit that all pending claims are patentable over the cited prior art references.

II. The Rejection Of Claims 1-14 Under 35 U.S.C. § 103

Claims 1-6, 9, 11 and 13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yonemura (JP 2003-346888) in view of Ohba et al. (USP No. 5,989,750) and Haruno et al. (JP 08-236101); claim 7 as being unpatentable over Yonemura, Ohba, and Haruno and further in view of Doi et al. (USP No. 4,210,709); and claims 8, 10, 12 and 14 as being unpatentable over Yonemura, Ohba, and Haruno and further in view of Carlisle (USP No. 3,227,583). Applicants traverse the above rejections for at least the following reasons.

With regard to the present disclosure, independent claims 1 and 10 recite, in part, a lead storage battery including: a negative electrode active material layer which includes Sb, and a separator which includes silica.

Features of the present disclosure include a lead storage battery that includes both a negative electrode active material layer which includes Sb, and a separator which includes silica. As a result of this combination, the corrosion at the tab of the negative electrode is significantly suppressed and the service life of the battery is substantially improved in the usage mode in which charge and discharge are frequently repeated under a low SOC range.

Applicants explained in the December 1, 2010 Amendment how the presence of both silica and Sb in a battery as recited in claims 1 and 10 produces unexpected, superior results.

It is alleged in the Response to Arguments section of the Office Action that the arguments in the previous response were against the references individually, and that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of the references. In response, Applicants direct the Examiner to page 9, line 19 to page 10, line 4 of the Response filed on December 1, 2010, which recites:

“there is no teaching or suggestion in Yonemura that the concentration of silica combined with the concentration of Sb results in a battery with significantly improved characteristics during lifetime conditions...[m]oreover, Haruno, Ohba and Carlisle fail to remedy this deficiency. As such, it is clear that the proposed **combination** of references fails to predict or suggest the unexpected results obtained from the claimed disclosure. Accordingly, it is clear that *Yonemura, Ohba, Haruno and Carlisle*

do not render independent claims 1 and 10 of the present disclosure obvious.” (emphasis added)

Applicants fail to see how this statement is interpreted to mean that the references were argued individually. The Examiner’s suggestion that the previous Response was an attack on the references individually is refuted by the passage highlighted above.

Moreover, the *Response to Arguments* section in the September 1, 2010 Office Action, to which the December 1, 2010 responded, explicitly states:

“in response to Applicant’s arguments, the Yonemura reference states that the composition controls the increase in loss of liquid, cancels the corrosion in the negative electrode and contributes to the life performance which is clearly suggesting the unexpected results as stated by the Applicant. Yonemura also teaches the Sb content to be within the range of 0.0001 to 0.1 mass % as stated in the rejection above [0014]. Applicant’s arguments for a battery A4 corresponding to Yonemura is unpersuasive.”

Nowhere in the *Response to Arguments* does the Examiner mention any other prior art reference other than Yonemura. As such, the Applicants addressed the specific arguments from the *Response to Arguments* section, including the fact that the other cited prior art does not remedy Yonemura’s deficiencies, and then stated that the combination does not render the pending claims obvious.

Furthermore, Applicants note that the Examiner has failed to address the arguments set forth in the previous response. For this reason alone, Applicants submit that the claims are allowable over the cited prior art.

In addition, Applicants note that the batteries disclosed in Yonemura, Ohba and Haruno are used in applications where charge/discharge is frequently repeated at low SOC. For example, the batteries of Yonemura, Ohba and Haruno are not intended for use in a stop and go system and a regenerative braking system. Rather, the batteries of Yonemura, Ohba and Haruno are used as a start up mechanism for vehicle engines.

For example, paragraph [0014] of Haruna teaches the same evaluation of the corrosion of negative electrode tabs upon overcharge (high SOC) as is taught in Yonemura. In col. 6, lines 59-63 of Ohba, low-temperature high-rate discharge performance and high-temperature life performance are evaluated in a standardized test for lead storage batteries for starting up engines (JIS D5301).

As is well known to those skilled in the art, batteries deteriorate differently and at different degrees according to how they are used. When batteries are used in an engine start-up capacity, the electrolyte decreases due to overcharge, and the negative electrode tab exposed from the electrolyte corrodes. In contrast, the present disclosure teaches the frequently repeated charge/discharge of batteries at low SOC results in corrosion of the negative electrode tab, which is immersed in the electrolyte (see, paragraph [0013] of the present disclosure). Thus, the present disclosure is directed to an entirely different use than the batteries described in the cited prior art.

As described in the present disclosure, in the usage mode in which charge/discharge is frequently repeated at low SOC, the corrosion of the negative electrode tab is suppressed and the battery life is improved significantly. This feature is not disclosed in the cited prior art.

Yonemura and Haruno are directed at suppressing the corrosion of the negative electrode tab exposed from the electrolyte. Ohba uses a separator which includes an acid-resistant and oxidation-resistant inorganic filler that has a specific pore distribution with the aim of improving low-temperature high-rate discharge performance and high-temperature life performance. Ohba is silent as to the corrosion of the negative electrode tab.

Accordingly, there is no motivation to use the separator of Ohba in the lead storage battery as taught by the combination of Yonemura and Haruno in order to suppress the corrosion of the negative electrode tab. Moreover, the corrosion of the negative electrode tab in Yonemura and Haruno appears to result from the electrolyte and oxygen. When the negative electrode tab is exposed to the electrolyte which has decreased due to overcharge, the electrolyte (film or droplets) adheres to the exposed negative electrode tab which is in contact with oxygen in the air. However, the major portion of the negative electrode tab excluding the base part thereof is not in contact with the separator (see, FIG. 1 Yonemura and FIG. 2a of Ohba). Thus, a skilled artisan would not likely recognize the relation between the corrosion of the negative electrode tab and the separator. Accordingly, the combination Yonemura and Haruno with Ohba is not obvious. Moreover, Carlisle does not, and is not relied upon to remedy this deficiency. Therefore, it is clear that Yonemura, Ohba, Haruno and Carlisle do not render independent claims 1 and 10 of the present disclosure obvious.

III. All Dependent Claims Are Allowable Because The Independent Claim From Which They Depend Is Allowable

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.*,

819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as claims 1 and 10 are patentable for the reasons set forth above, it is respectfully submitted that all pending dependent claims are also in condition for allowance.

IV. Rejection Of Claims 1-4, 6 and 10 Under Nonstatutory Double Patenting Doctrine

Claims 1-4, 6 and 10 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-4 and 8 of copending U.S. Application No. 10/587,186 to Sugie in view of Haruno et al. (JP 08-236101) and Carlisle (USP No. 3,227,583); and claims 1 and 10 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of copending U.S. Application No. 10/587,187 to Sugie in view of Ohba et al. (USP No. 5,989,750), Haruno and Carlisle.

With regard to Application No. 10/587,186, since the rejection is provisional, Applicants respectfully request that the rejection be withdrawn until such time as claims in either application have been indicated to be allowable. As claims are often amended during prosecution, it is possible that the claims determined to be allowable may be patentably distinct from one another. According to PAIR, as of today March 7, 2011, the claims of Application No. 10/587,186 have yet to be allowed. As such, Applicants respectfully request that the double patenting rejection of claims 1-4, 6 and 10 be withdrawn.

With regard to Application No. 10/587,187, Applicants note that Sugie fails to discuss using silica in the separator. Further, although Ohba may disclose the use of silica, nowhere in any of the cited prior art references discuss the unexpected superior results as discussed above. Accordingly, Applicants submit that the obviousness-type double patenting of claims 1 and 10

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over claim 1 of Sugie in view of Ohba, Haruno and Carlisle is improper. As such, Applicants respectfully request that the double patenting rejection of claims 1 and 10 be withdrawn.

V. Conclusion

Having responded to all open issues set forth in the Office Action, it is respectfully submitted that all claims are in condition for allowance.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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